

negative. It is invariably so in European races, where the differences oscillate between -5° and -39° . In the inferior races it may amount to $+5^{\circ}$; in adult anthropoids on the other hand, the minimum is found as high as $+32$, while in some gorillas it amounted to $+45$. In women the orbito-basilar angle is habitually from 2 to 3 degrees less than in men.

The decrease in the population of France still continues to excite much speculation. In tome 12, sér. 2, of the *Bulletins* will be found a suggestive paper by M. Després, on the relation between the birth-rate of a country and its enforcement of restrictive enactments intended to diminish the result of public immorality. In comparing Belgium with France a difficult question suggests itself in the fact, that while both countries are under sanitary official supervision, and Belgium next to France has the lowest birth-rate, it has 279 legitimate births against every thousand married women between the ages of 15 and 50, although France has only 174 in the 1,000. The latter has, however, the large number of 140 married women of those ages in every 1,000, while the former has only 105 in the 1,000. In England, on the other hand, before the enactment of any sanitary restrictions, 248 legitimate births were registered for every 1,000 married women of the given ages, (the proportion of married women from 15 to 50 being 133 in the 1,000). But while in this country 120 for every 1,000 men marry between the age of 20 and 25, in Belgium only 33, and in France not quite that number, out of every 1,000 men marry at the same age. This later marriage of the men M. Després regards as an important factor in the lowness of the French birth-rate.

VOLCANIC PHENOMENA AND EARTH-QUAKES DURING 1878

THE statistical review of volcanic phenomena during 1878, which Prof. Fuchs has recently published, and which forms the continuation of many previous statistical accounts of the same nature (see *NATURE*, vol. xv. p. 557, and vol. xviii. p. 241) shows the unusually large number of twelve eruptions in the course of the year. Most of them occurred in remote localities and gave evidence of the activity of volcanoes which were generally but little known, and which are all difficult of access. It is true, however, that Mount Vesuvius also, the last eruption of which had taken place in 1872, but which already during 1877 had shown symptoms of the re-awakening of the volcanic process, again entered into a period of activity on April 20, 1878. The mountain ejected ashes, frequent slight shocks occurred, a thick column of smoke ascended, and at the end of September a scanty flow of lava took place. This increased during the night of September 22-23 and the lava descended as far as the Atrio del Cavallo; but afterwards the volcanic activity sank down into the ordinary solfatara-state, which was only interrupted by little periodical explosions on October 11, and by the flow of little streams of lava from November 1 to November 9.

At the southern point of South America active and hitherto unknown volcanoes were repeatedly seen by passing ships, viz. on January 10 and 18; one of them is situated upon the middle island in the English Narrows, the other on the South American continent in about $48^{\circ} 56'$ lat. S.; this one was conspicuous by a majestic column of smoke, ejected from a high snow-clad mountain, and rising to a height of some 300 metres.

At the same time a great eruption occurred in the island of Tanna, the well-known and very active volcanic island in the archipelago of the New Hebrides. On January 10, at 10 a.m., between the so-called Sulphur Bay and the old crater, a new eruption cone formed; the outbreak was accompanied by a mighty tidal wave which inundated a great part of the island. In spite of its violence the eruption lasted only a short time, but on February 4, a second outbreak followed which also did great damage.

Simultaneously yet another eruption happened. Its seat was the large island of Birara, in the group of New Britain. The northern part of the island was completely devastated, and its coasts rendered inaccessible through enormous masses of pumice stone, which covered the sea for many miles. Formerly, no volcano had been known there. We have repeatedly referred to the masses of floating pumice stone in the vicinity of the Solomon Islands, through which, as Captain Harrington reported, ships had to force their way for two or three days. It is very probable that this pumice stone originated from the eruption on Birara, and not from some submarine eruption, as was generally supposed at the time of the occurrence. It is true that there are two volcanoes in the Solomon Islands, the Semoya and the

Lammat upon the island of Guadalcanar, but from neither were any eruptions reported during 1878.

The third eruption of February, took place from the volcano Isluga in South America (lat. $19^{\circ} 10'$, S), which mountain had been inactive since 1869. The outbreak was accompanied by a fearful earthquake, and so great were the masses of lava ejected that the villages of Cariquima, Carima, Sotoca, and Chiapa, all situated at more than five leagues' distance from the volcano, were completely destroyed by the incandescent streams.

Smaller volcanic eruptions occurred from Mount Hecla (from February 27, to the end of March), from the Asamayama in Japan, from the Cotopaxi near Quito (in October), from the Tepaco, the Sitna, and the Isalco in San Salvador. The eruptions in the Aleutian and Society Islands were of greater importance. In the volcanic series of the Aleutian islands, the volcanoes on Amukta, Tscheguluk, and the Vsevidok volcano (almost 2,800 metres high) on Umnak were in eruption. In the Society Islands, according to the report of Captain Evers, the islands of Raiatea, and Borabora were completely devastated by the action of volcanoes.

At the end of the list of lava-eruptions Dr. Fuchs records the great mud-eruption of one of the well-known mud-volcanoes near Paternò in Sicily. After repeated shocks of earthquake in the province of Catania spreading over two months, this eruption began on December 10, numerous craters ejecting streams of mud with great noise. Several of these craters were continuously active, as the mud was of little consistency, and freely permitted the ascending gases to escape. The others had explosions from time to time, as the crater basin was filled with much thicker mud, which prevented the gases from passing upwards until their tension was sufficiently high, and they ejected the mud in high rays. At the end of the year this mud-eruption was still progressing with unabated force.

The number of earthquakes reported during 1878 amounts to 103. But amongst these there are many complete earthquake-periods during which shocks and oscillations lasted with short intervals for hours, days, and even for several weeks in the same locality. If we would or could count all the separate shocks which occurred, a very high total would be reached. Thus in the comparatively unimportant earthquake of Zengg twenty shocks were counted, and in the great earthquake of Terapaca in the night of January 23 no less than forty shocks, while the oscillations lasted here almost without interruption until April 12. An earthquake on the island of Tanna (New Hebrides) lasted for four weeks, and in the province of Catania the oscillations succeeded each other almost without interruption from October 4 to November 19.

The earthquakes were most frequent in winter and autumn, thirty-nine occurring in winter, twenty-six in autumn, and nineteen each in summer and spring.

The most violent and most destructive of all these phenomena happened on January 23 in that district of Peru and Bolivia in which the terrible earthquake of 1868 took place. The province of Terapaca suffered more than any other. Here, with the earthquake of May 9, 1877, which in violence was hardly surpassed by that of 1868, a great and considerably extended period of frequently-recurring oscillations had begun, amongst which the earthquake of January 23, 1878, was prominent by its particular force. At Iquique it began at 7.55 P.M., and the shocks continued during the whole night. As usual, the subsequent tidal-wave did still greater damage than the earthquake itself, and this was particularly the case at Arequipa, Pica, Mantilla, Pisagua, Arica, and Terapaca.

The earthquake on October 2, in the southern part of the republic of San Salvador, was also very violent. In the town of Incuapa almost all the houses were destroyed, and many of the inhabitants perished. In the vicinity a number of villages disappeared entirely. The motion of the soil was first undulatory and ended with a terrible shock.

Of European earthquakes the following must be mentioned specially:—

On January 28, about noon, an earthquake shook the north-western part of France and the south of England. It was particularly distinct in Normandy, at Rouen, Havre, and Dieppe. Even in Paris the shock was so considerable that several houses were endangered. In England it occurred between 11.45 and 11.50 A.M., and was observed at Greenwich, London, Brighton, Southampton, Cowes, and several other places.

Repeatedly shocks were felt in north-western Switzerland and at the south-west corner of the Black Forest. The first and more marked phenomenon happened on January 16, and con-

sisted of several shocks separated by short intervals. These shocks were noticed at Basel, Brugg, Solothurn, on the Swiss side of the Rhine, and at Lörrach, Schopfheim, Waldshut, &c., on the Badish bank. They recurred at Basel on January 17, and on March 29 they were again felt in the whole area described, and then even at Freiburg and Strasburg.

Other instances of repeated earthquakes are:—

Innsbruck (January 3, 10, 11, February 2, August 9).

Gross Gerau (January 2, March 25).

Lisbon (January 26, 27, June 8).

Piemont (repeated shocks on November 25).

Constantinople, Ismid, and Brussa (continual shocks from 19 to end of May).

The damage done by the last-mentioned phenomenon at Ismid and Brussa on April 19 was very considerable; the little town of Esmé was quite destroyed, and many inhabitants lost their lives. The English fleet, which happened to be anchored in the Bosphorus at the time, noticed the oscillations, and on board of one of the ships it was believed that the others were making torpedo experiments, and consequently looked out for shelter.

Less remarkable by its violence than by its enormous extent considering its intensity, was the Low-Rhenish earthquake of August 26. The observations in this case were unusually exact and numerous, which gives additional interest to the occurrence. It began about 9 A.M., and was best observed in the city of Cologne. Here it consisted of an undulatory rising and sinking of the ground, which increased in intensity to such an extent that some buildings began to oscillate ominously. On the cathedral tower the smaller bell struck several times and the wavering pillars in St. Gereon's Church caused such a panic among the congregation, that all rushed out. In many parts of the city the walls of houses showed cracks. At the end of the oscillations a dull subterranean noise was heard and a second shock was observed by many persons. In almost all localities in the Rhenish Province, from Cleve and Emmerich to Kyllburg, Ottweiler, and Montjoie the observations of the phenomenon were similar to those made at Cologne; the same was the case on the opposite bank of the Rhine, at Düsseldorf, Wiesbaden, Münster, and other places. At Aachen (Aix-la-Chapelle) five distinct shocks were noticed; at Elsdorf (on the Neuss-Düren Railway) no less than eighteen until the morning of August 27; and at Düren and Buir their number was but little below this figure.

The area struck by the first shock, on August 26 at 9 A.M., may have measured over 2,000 geographical square miles, as its outlines may be indicated as follows:—Arnsberg and Hanover in the north, Offenbach on the Main and Michelstadt in the Odenwald in the south-east, Strasburg, Paris, and Chareville in the south, Liège and Brussels in the west, and Utrecht in the north-west.

Prof. Klinkerfues has collected the most reliable observations of time and reduced them to the meridian of Paris. According to these calculations the earthquake happened at Cologne at 8h. 38'7m., at Strasburg at 8h. 39'9m., at Göttingen at 8h. 40'9m., at Hanover at 8h. 42'4m., and at Paris at 8h. 45'0m. If the starting point of the oscillations according to number and intensity of the shocks be supposed to have been situated about 2'5 geographical miles to the west of Cologne, the above indications of time give a velocity of the earthquake in the ground of 6'78 geographical miles, with a probable error of $\pm 0'48$ miles. The depth of the original starting-point is unknown. Prof. Klinkerfues is of opinion that it laid between 6'3 and 8'7 geographical miles from the surface. It is remarkable that the phenomenon was only noticed at the surface, and was all the more intense the higher the observer was above the ground. Many observations were made both at Cologne and at Hanover, which show that the oscillations were far more considerable in the upper storeys of houses than in the lower ones. At Remagen the shock was so great on the upper floor of the school-building that teachers and school-children rushed terrified into the street, while on the ground floor the phenomenon was hardly noticed; the workmen on the towers of Cologne Cathedral saw the scaffolding oscillate to such an extent that they feared for their lives, and a water-tank on the vault of the choir was almost entirely emptied. Yet not one of 1,100 miners working at a depth of 300 metres at Altessen noticed the least shock.

For a long time afterwards shocks occurred at Elsdorf and Buir. At the latter place they were observed on August 26, 27, 28, 29, September 2, October 24, December 3 and 10. Also in other places of the same area the shocks were repeated, so at

Remagen (September 3), Wiesbaden (September 14), Osterrath and Crefeld (September 18), Cologne (December 10), Luxemburg and Namur (December 15).

With almost all earthquakes of slight intensity it is very difficult to determine to what class of earthquakes they belong. Thus in the Low-Rhenish earthquake no symptom points to any particular cause. We may surmise volcanic influence, because the most intense and most numerous shocks occurred near the north-western slope of the Eifel-plateau; but with perhaps greater reason we may look for the cause of the phenomenon in the Rheno-Belgian coal district. Altogether the earthquake of August 26 seems to be but a link in a great earthquake-period, which for some years past has been causing lasting changes in the coal-deposits of that neighbourhood. The names of Herzogenrath, Kohlscheid, Eschweiler, &c., recur in every one of Dr. Fuchs's yearly accounts, and apart from numerous weaker oscillations of small extent, considerable earthquakes occurred in this district from September 28 to November 12, 1873, and on June 24, 1877.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

It is stated that the draft charter of the proposed Victoria University has, in accordance with the request of the Lords of the Privy Council, been submitted to that body. According to this draft, the University would have the power of conferring upon all persons, whether male or female, who have pursued a regular course of study in any of its colleges and passed its examinations, all degrees which can be conferred by any other University of the kingdom, with the exception of medical degrees, the Privy Council having declined to confer power as to these at a time when legislation on the whole subject of medical degrees and the licensing power for the practice of medicine has been proposed to Parliament and still remains unsettled. The charter, it is stated, contains provisions for establishing a convocation of graduates of the University, with appropriate rights and functions.

In the late Higher Local Examinations of Cambridge University, Physiology and Experimental Physics were introduced as separate subjects in Group E for the first time. One student, Miss A. Johnson, of Cambridge, passed in Physics, and out of sixteen who entered their names in Physiology, in which subject Mr. J. N. Langley, Fellow of Trinity College, was examiner, eleven passed, but no candidate obtained the mark of distinction. Only three passed in Zoology out of eighteen candidates; but two were distinguished; the failures were about three-fifths of the thirty-four candidates in Botany, and three obtained distinction. Twenty-two passed in Geology and Physical Geography, five obtaining the mark of distinction. In the first class of Group E four students are placed: Miss C. E. Cross, educated at 56, Regent Street, Cambridge, is distinguished in Botany and Geology, and passes in Chemistry; Miss L. M. Passavant, of De la Haye House, Leeds, is distinguished in Botany and Zoology; the candidate numbered 294, Leeds, name not published, is distinguished in Geology and Zoology, and has passed in Physiology; Miss M. A. Broadhurst, Liverpool College for Girls, is distinguished in Geology and Chemistry. Six passed Second Class in Group E, and twenty-eight were placed in the Third Class, to attain which passing in one subject is required, no more than three to be taken in any one year; others may be taken in subsequent years. In Group C (Mathematics) only two obtained distinction, namely, A. G. Lee, Dedham, Essex, and C. E. Oldaker, Chesterton Road, Cambridge, and eight obtained a First Class. The award of Scholarships dependent on the results of this examination has not yet been known.

ABOUT three years ago publicity was given to a proposal by Mr. Holloway, of Oxford Street, to expend a considerable amount of money in the erection of a college for the higher education of women. Since that time Mr. Holloway has purchased about ninety-five acres of land at Egham, near Virginia Water, known as the Mount Lee Estate, and has vested the same in trustees. Before deciding upon the form of the building, Mr. Holloway and his architect, Mr. W. H. Crossland, visited the principal collegiate institutions in Europe, and during the past year the plans and specifications have been completed. We now learn that a contract has been actually signed by Mr. Holloway for the building of the college within four years, the contract price being upwards of 250,000*l.*, exclusive of fittings